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Commentary

Implications and Effects of Microbial Colorants

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DESCRIPTION

Color is one of the most important visual properties, and has a great impact on our lives. It is the significant aspect of any product that a consumer notices, and has a considerable effect on the decision making while buying goods. Synthetic colorants are frequently used because of their vivid colors, stable qualities, ease of usage, and low cost. The possible dangers of using synthetic hues, on the other hand, have sparked significant alarm. Natural colorants have gained popularity in the business, as a result of their better biodegradability and environmental compatibility. Plant, animal, mineral, or microbes are the sources of natural colorants that find usage in variety of applications such as textiles food coloring, cosmetics dye-sensitized solar cells, histology staining, pH indication and various other sectors. Among the natural colorants, carotenoids are the pigments that have acquired a great deal of interest from researchers because of their biotechnological applications, and more importantly, because of their possible health benefits. In a world dominated by chemical or plant-derived carotenoids, bacterial carotenoids offer a great advantage of economic viability and cost effectiveness that should be pursued as a practical alternative.

Microbes used in industrial carotenoid production must be able to use a wide range of carbon and nitrogen sources including agro-industrial waste, should have moderate growth conditions, be resilient to stress, have a decent color yield, be non-pathogenic, and be easily separated from cell biomass. Due to a variety of industrial constraints and failure to satisfy the above-mentioned criteria, barely handful of microbes have eventually reached commercial production levels, limiting most of the microbial carotenoid productions at the research and development stage. This emphasizes the importance of broadening the range of carotenoid producing microbes and utilizing their carotenoid-producing capabilities.

The identification of the genetic and molecular basis of carotenoids accumulation in these microorganisms may aid in the designing appropriate strategies for increased and efficient carotenoids production. External factors such as culture conditions and environmental parameters are also known to influence bacterial growth and carotenoid production, thus directing their biosynthesis routes. In large-scale cultivation, laboratory scale optimizations employing the one factor at a time technique for modifying environmental parameters such as pH, temperature, carbon source, nitrogen source, salinity, and so on are time consuming and frequently yield inconsistent data.

CONCLUSION

To overcome these limitations, use of statistical-based optimization methodologies and applying the optimized parameters during scale-up trials could be an achievable option. Apart from this, employing stress conditions or use of inducers. Can impact the carotenoid yield in a bioreactor. These solutions improve process development and aid in the increase of carotenoid yield at the industrial level. The bacteria belonging to the genus Rhodococcus are non-photosynthetic and are known to produce different types of carotenoid pigments. However, only a few Rhodococcus species have been explored so far in terms of their carotenogenic potential. The majority of colorants are either dyes or pigments, or a combination of the two. While dyes are water soluble and predominantly employed in the textile business, pigments are insoluble compounds that are widely used in the ceramics, plastics, and painting industries.

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